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June 23, 2011

U.S. Environmental Protection Agency
Region 6
Water Enforcement Branch
1445 Ross Ave, Suite 1200
Dallas, Texas

Attn: Robert Houston

Subject: ENSCO 8502 Cooling Water Plan



The ENSCO 8502 is submitting its Cooling Water Plan to confirm that the unit's system meets the Cooling Water Plan requirements of the Clean Water Act section 316(b). The ENSCO 8502 will conduct operations in United States Outer Continental Shelf Gulf of Mexico (Region 6).

Should you have any questions or require clarification of the ENSCO 8502 Cooling Water Plan, please contact Isabela de Souza, Environmental Engineer for Enscoplc at idesouza@enscoplc.com.

A handwritten signature in black ink.

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Received
JUN 27 2011
6EN-W



Cooling Water Intake System (CWIS) EPA Intake Velocity Study Results

1.0 INTRODUCTION

The ENSCO 8502 has been contracted to work in the Gulf of Mexico for Nexen Petroleum. As such, rules and regulations as required by local and federal agencies are to be observed. One such entity that will regulate our operations in this region is the U.S. Environmental Protection Agency (EPA).

The EPA Clean Water Act §316(b) Rule III regulates the Cooling Water Intake Systems (CWIS) impact on marine wildlife. As a means by which to limit the impact of such operations on the marine wildlife, this EPA regulation stipulates that the intake velocity through cooling water intake structure screens is not to exceed 0.5 ft/sec. This regulation applies to new facilities constructed after 2006, with a CWIS greater than 2 million gallons of water per day.

The EPA regulation on CWIS flow velocity applies to our new build semi-submersible rig series including ENSCO 8502, ENSCO 8503, ENSCO 8504, ENSCO 8505 and ENSCO 8506. As a result calculations were carried out to help determine the optimal sea chest size and velocities during construction. This report details the "As-built" condition of the ENSCO 8502.

2.0 DOCUMENT OBJECTIVE

The purpose of this document is to outline the scope of the ENSCO 8502 study and the different flow cases analyzed. This document will also describe the following:

- Different systems that demand flow from the sea suctions,
- Sea chest arrangement and locations,
- How the systems tie into each other and the sea chests,
- Flow rates demanded by the various systems.

From the cases that were analyzed, this document will provide the resulting flow velocities through the sea chests.

3.0 CWIS ARRANGEMENT

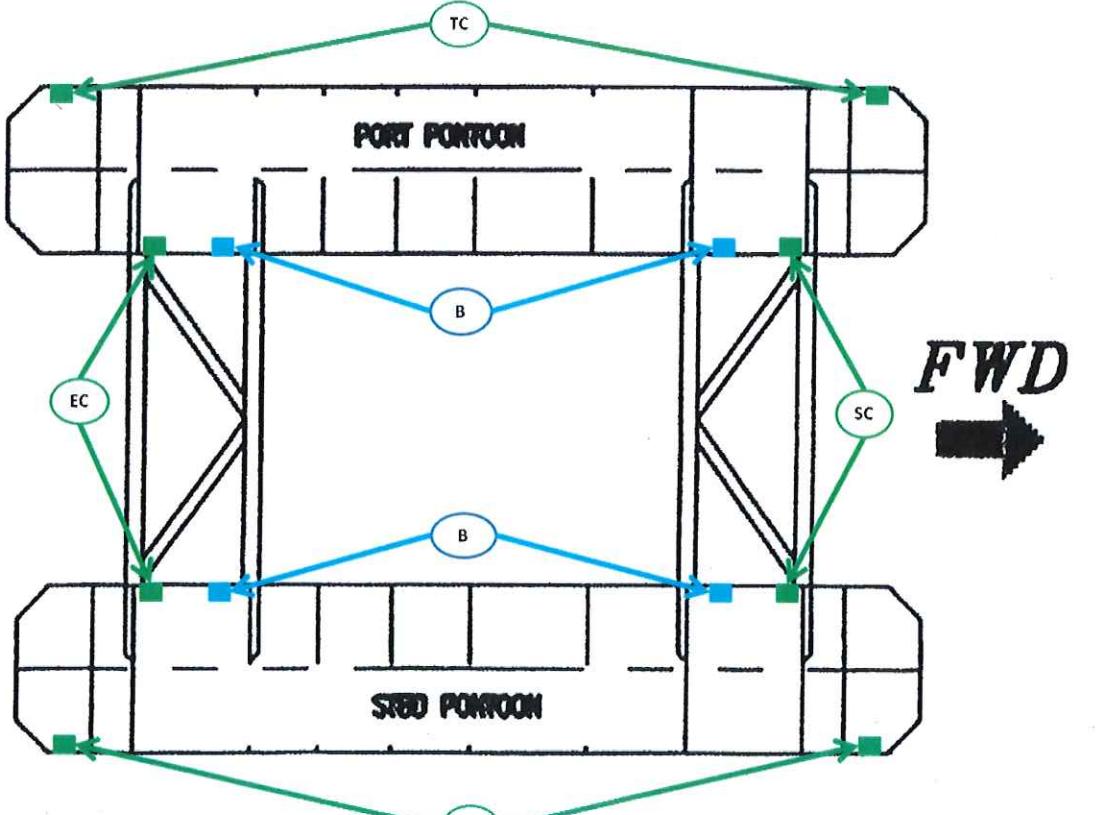
The EPA regulation setting the maximum sea chest flow velocity is only with regard to the cooling water intake system. However, in order to thoroughly investigate the flow velocities of all the systems will be described that draw sea water through sea chests.

3.1 Sea chests

The ENSCO 8502 is a rectangular vessel floating on two submerged pontoons. The rig is divided into quarters, and each end of a pontoon is referred to as a quadrant. Each

quadrant has an identically sized set of sea chests and pumps. The diagram below shows the three sea chests per quadrant labeled as B, TC, EC or SC. (Note that sea chests EC and SC are identically sized).

- B** (Ballast) sea chest is primarily set up as the ballast inlet to the ballast pumps and are always located on the inboard side of the pump room in each pontoon (between the 13th and 14th ring stiffener from pontoon end). There is also a branch off this header line for the fire system pumps. Since the "B" sea chest cannot supply any cooling systems, these sea chests were not investigated in this report.
- TC** (Thruster Cooling) sea chest is located on the outboard thruster room in each quadrant (between the 3rd and 4th ring stiffener from pontoon end).
- SC** (Salt Water Cooling) sea chest is located on the inboard side of each forward pump room (between the 7th and 8th ring stiffener from pontoon end).
- EC** (Engine Cooling) sea chest is located on the inboard side of each forward pump room (between the 7th and 8th ring stiffener from pontoon end).



3.2 Ballast system

The ballast system is used to change the draft or trim of the vessel by pumping sea water into or out of ballast tanks located within the vessel. This water is drawn through one sea chest per quadrant as noted above. This system typically is in operation less than 3% of the time as a sea water inlet. This system is not a cooling system, so for the purposes of this report was not investigated.

3.3 Fire System

The Fire System sea water inlet branches off of the ballast system in each quadrant. This system does not run all the time and typically is in operation drawing water through the sea chest only for fire-drills. This system was not investigated for the purposes of this report.

3.4 Thruster Cooling System

The Thruster Cooling System sea water inlet branches off to two separate pumps in each quadrant. There are two thrusters per quadrant. Each pump is capable of 300 gpm and supplies all the cooling requirements for the thruster including main bearings, electric (DC) motor and hydraulic power units within each thruster room. The maximum possible flow rate per quadrant (sea chest) is 600 gpm.

3.5 Engine Cooling System

The Engine Cooling System sea water inlet is used to feed one or both engine cooling water pumps in that (aft) pump room. Each pump is rated 2000 gpm and there are 4 engine cooling pumps total. Engine cooling requirements for the 7 engines located on the main deck are 745 gpm each. Typically there is more cooling water available than required and the excess is discharged by a back-pressure valve to overboard prior to reaching the engine cooling inlets.

The Engine Cooling System for a sister vessel, ENSCO 7500, was investigated over an 8 month period while operating for Chevron USA in the gulf of Mexico in 2007 and it was determined that the cooling pump requirements were as summarized below;

Number of Engines in operation	Percent of time	Engine Cooling water pumps typically used	Max possible flow rate through sea chest
2	26.6	1	2000 gpm
3	59.9	2	4000 gpm
4	11.6	2	4000 gpm
5	1.6	3	4000 gpm
6	0.3	3	4000 gpm

Therefore for the purposes of this study, since it is always likely that at least 2 Engine cooling pumps can be run simultaneously in one quadrant, this 4,000 gpm was considered as the "Design Case".

3.6 Salt Water Cooling System

The Salt Water Cooling System sea water inlet is used to feed one or both sea water cooling water pumps in that (forward) pump room. Each pump is rated 2000 gpm and there are 4 pumps total. Equipment cooling requirements for the various main deck and drilling equipment are estimated at 1091 gpm total for normal operations. Typically there is more cooling water available than required and the excess is discharged by a back-pressure valve to overboard prior to reaching the various cooling inlets. The Mechanical Supervisor determines when additional pumps must be brought on line based on the system back-pressure. Just like the engine cooling pumps, the maximum that can be run in any quadrant is 2 pumps producing a maximum flow through the sea chest of 4,000 gpm.

3.7 Salt Water Cooling to Engine Cooling System Crossover

There is a crossover for emergencies that allows the Salt Water Cooling System to be fed to the Engine Cooling System. This crossover is at the main deck and has no effect on any quadrants maximum flow rate.

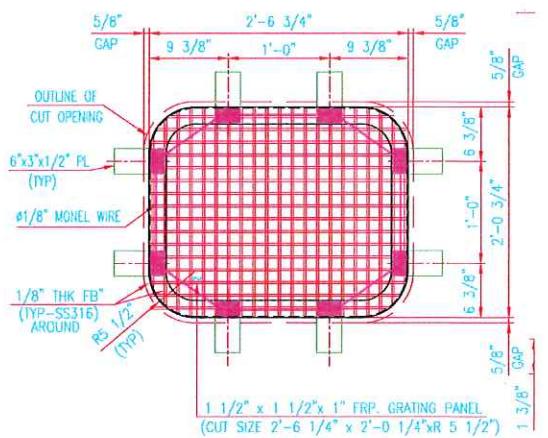
4.0 Conclusions and Maximum CWIS Velocities

The sea chests are constructed as a protruding rectangular opening. Several inches inside this opening there is a grating strainer and this was the area used to determine the maximum CWIS velocity. The grating information manufacturer's website shows a 69% open area:

Height (mm)	Mesh Size (mm)	Open Area	Weight (kg/m ²)
25	38 x38	69%	12.32

4.1 Thruster Cooling System Conclusions

There are 4 identically configured thruster cooling systems, each with a maximum flow rate of 600 gpm. Each sea suction is identically sized as depicted below.

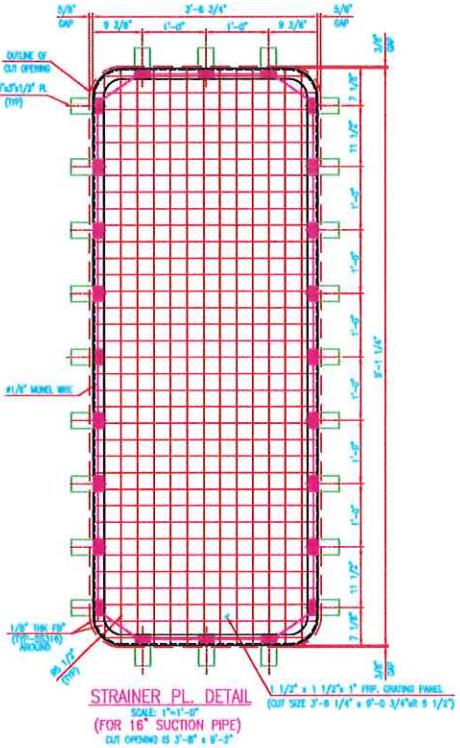


Thruster Sea chests	Size	Shape	Area (ft ²)	Velocity at max flow rate of 600 gpm (ft/sec)
Shell opening @ Cover plate	3' x 2' 6"	Square	7.5	0.18
Cut opening	2' 8" x 2' 2"	Square with radius corners	5.40	0.25
Grating Cover (69% of unobstructed area)	2' 6-3/4" x 2' 0-3/4"	Square with radius corners	3.39	0.39
Maximum allowed by EPA				0.50

Based on the above, flow rates do not exceed the maximum allowable per the EPA rules for the Thruster Cooling Systems on the ENSCO 8502.

4.2 Engine and Salt Water Cooling Systems Conclusions

There are 4 identically configured quadrants, two with Engine Cooling and two with Salt Water Cooling systems, each producing a maximum flow rate of 4,000 gpm with both pumps in that quadrant running. Each quadrant's sea suction is identically sized as depicted below.



Engine /SW Cooling Sea chests	Size	Shape	Area (ft ²)	Velocity at max flow rate of 600 gpm (ft/sec)
Shell opening @ Cover plate	3' 8" x 9' 2"	Square	33.61	0.27
Cut opening	3' 4" x 8' 10"	Square with 5.5" radius corners and 24 tabs	28.40	0.31
Grating Cover (69% of unobstructed area)	3' 2-3/4" x 8' 8-3/4"	Square with 4.825" radius corners and 24 tabs	18.74	0.48
Maximum allowed by EPA				0.50

Based on the above, flow rates do not exceed the maximum allowable per the EPA rules for the Engine Cooling or Salt Water Cooling Systems on the ENSCO 8502.



5.0 Appendices

ENSCO 8502 General Specifications (from Enesco Web Site)

Drawings:

B298-D001-General Arrangement-Outboard Profile

B298-D002-General Arrangement-Forward Profile

B298-D003-General Arrangement-View of Pontoon

H153-01 (sh 1 of 2) sea chest arrangement and details-fwd

H153-01 (sh 2 of 2) sea chest arrangement and details-fwd

H153-02 (sh 1 of 2) sea chest arrangement and details-aft

H153-02 (sh 2 of 2) sea chest arrangement and details-aft

P101-1 (sh 2 of 3) Ballast Bilge System

P101-1 (sh 3 of 3) Ballast Bilge System

P103-4 (sh 1 of 2) Salt Water Service System (Thruster Cooling)

P103-4 (sh 2 of 2) Salt Water Service System (Thruster Cooling)

P113-1 Engine Cooling (Pump Rm and Engine Rm)



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ENSCO 8502

GENERAL INFORMATION

Flag Liberian
Previous Name(s) –
Year Built 2010
Builder KFELS - Singapore
Design Dynamically Positioned DP-2
Classification A. B. S. Maltese Cross A1 column stabilized
drilling unit

MAIN DIMENSIONS

Pontoons 56' x 24' x 310'
Moon Pool 30' x 120'
Columns 50' x 45'
Keel to Main Deck 97' 0"
Main Deck 240' W x 255' L

MACHINERY

Main Power (7) EMD series ME20-710G7C - 5,000
(Marine/Continuous) BHP/each; (7) Baylor S855YNV - 643,
3,580 KW generators
Power Distribution NOV-ABB, 25.1 MW, 4,160-volt main
power generation distributed through transformers for marine
and drilling functions
Emergency Power (1) Cat 3512B, 1,476 HP
Thrusters (8) Flowserv Pleuger WFDS-340-2610, 3,500
HP/each

OPERATING PARAMETERS

Water Depth 8,500'
Maximum Drilling Depth 35,000'
Air Gap 34' @ 55' drilling draft
Transit Speed 3.5 knots @ 45' draft
Variable Drilling Loads 8,000 t
Operating Conditions 8,000 s. tons @ 55'
Survival Conditions 8,000 s. ton @ 45'
Transit Conditions 5,800 s. ton @ 25'

DRILLING EQUIPMENT

Derrick NOV 201' x 46' x 40'; 2,000,000 lb static hook load
Drawworks NOV ADS-30Q, 6,000 HP, 2" Drill Line
Rotary NOV RST 605 hydraulic, 60 1/2" opening, 1,000 ton
Top Drive NOV-TDS-1000A (1000 ton) 7,500 psi, GEB-20B
1150 HP (AC Motor), PH-100
Drill String Compensator NOV, CMC-H-1000-25, 1000K
Travelling Block NOV HTB 7-72TB-1000, 1,000 ton
Pipe Handling NOV-BR-15 Bridge Racker with Z-Back racking
guide arm 3 1/2" - 22", HTV machine up to 22", PR-45-90HS
Catwalk machine, AR4500 & ST-120 iron roughnecks, PS30
slips, BX4 & BX5 elevators, 1 x 45' & 1 x 60' telescopic foxholes
Cementing BJ Seahawk Unit
Mud Pumps (4) Lewco, W-2215, 2,200 HP, 7,500 psi



HOISTING EQUIPMENT

Deck Cranes: (2) Seatrax S90 Model S9032, 160' Boom. Lifts
at 70' radius: Offboard 79 ST, Onboard 88 ST. 1m Hsig, 40 knot
winds; CCM-7000 Load Indicators.
Riser Gantry Crane: (1) Patriot 106' span, 52 ST capacity

CAPACITIES

Active Mud Pits 4,500 bbls
Reserve Liquid Mud Storage 11,700 bbls
Bulk Mud/Cement 26,000 cu. ft.
Sacks 8,000 sacks
Drill Water 14,000 bbls
Potable Water 1,570 bbls
Fuel Oil 16,700 bbls

WELL CONTROL SYSTEMS

BOP (6) Ram Hydril 18 3/4" 15 M; dual Hydril annular 18 3/4"
10M GX; (1) Cameron HC 18 3/4" 10 M LMRP Connector; (1)
Dril Quip Model DX-DW 18 3/4" 15 M Wellhead connector
BOP Handling 400 ton BOP cart & elevator; 150 ton Xmas tree
cart, 400 ton Casing hang-off
Control System Hydril Multiplex, 5,000 psi
Riser Details Drill-Quip 21" 2,500,000 lb. flanged - 4 1/2" ID C/K
lines - 4" ID Booster line; Dual 2 7/8" ID hydraulic conduit lines
Riser Tensioner (10) NOV, 250 kips / each
Diverter Drill-Quip FDS, 60", 500 psi
Drill Pipe 6 5/8" x 34 ppf & 40 ppf, S-135, 6 5/8" FH, range 3; 5"
x 19.5 ppf, S-135, GPDS50, range 3; HWDP: 6 5/8", 5", S-135;
Landing String: 6 5/8", 68 ppf, Z-140, 6 5/8" FH, Range 2
Drill Collars 9 1/2"; 8 1/4"; 6 3/4"
Choke and Kill Manifold WOM 3 1/16" x 15,000 psi, with dual
hydraulic power chokes

MOORING

Winches (4) Brohl, RAMW-2050 (460 kips)
Wire 3 1/2", 2,500', 6 x 55
Anchors (4) Vrijhof-Stevpris MK5, 9 MT

HELIDECK

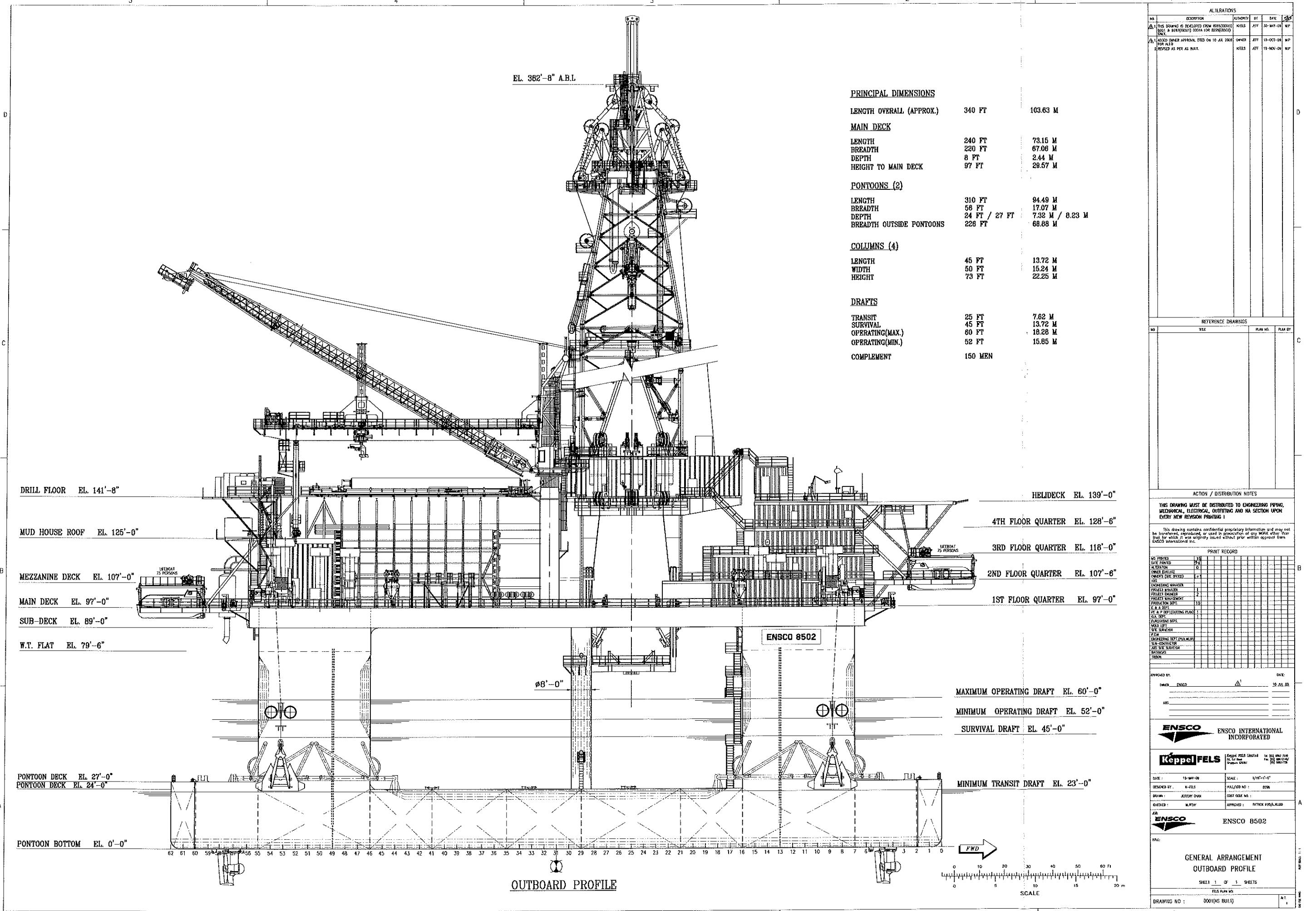
Sikorsky S-61 or S-92, 73' diameter

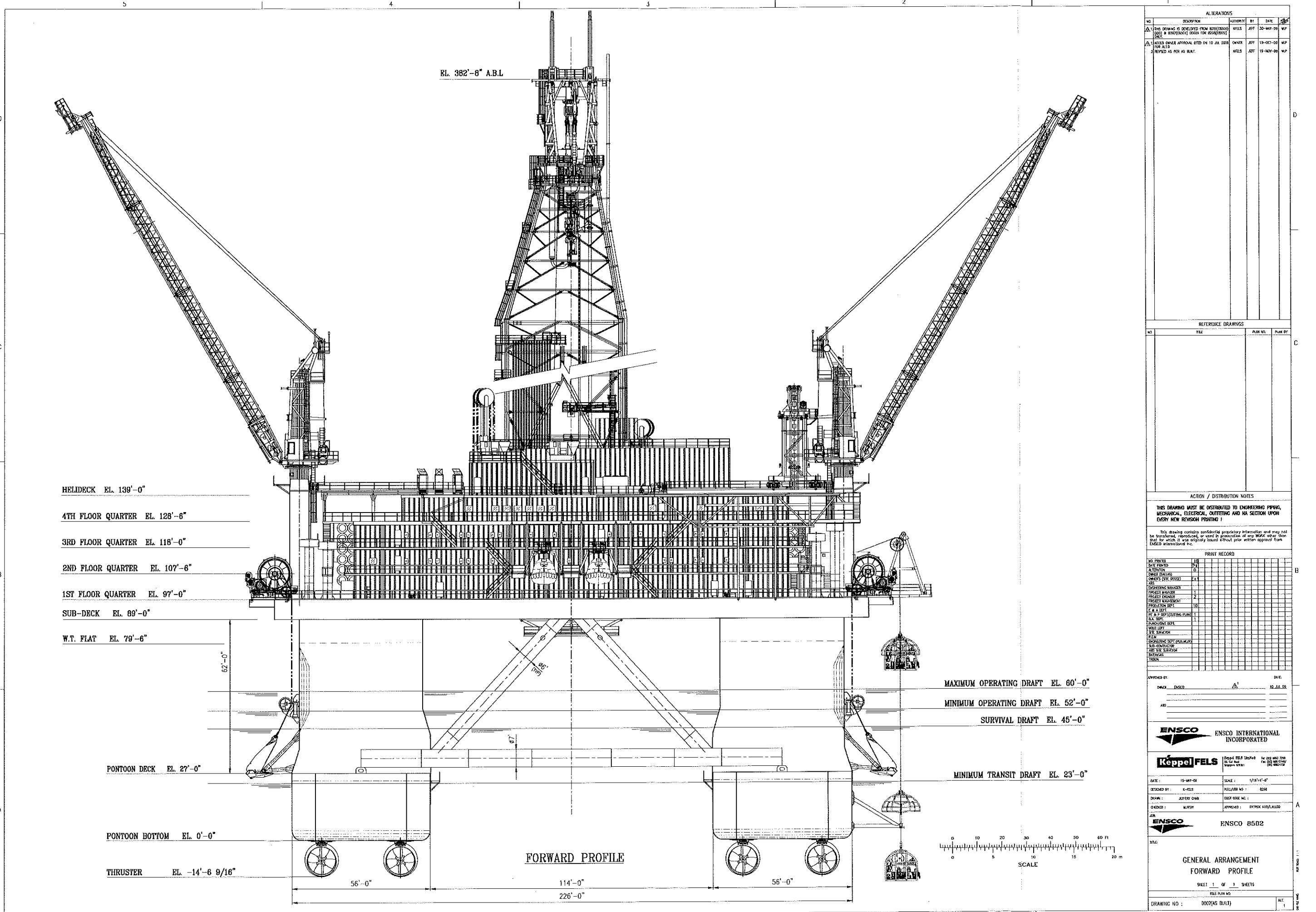
ACCOMODATION

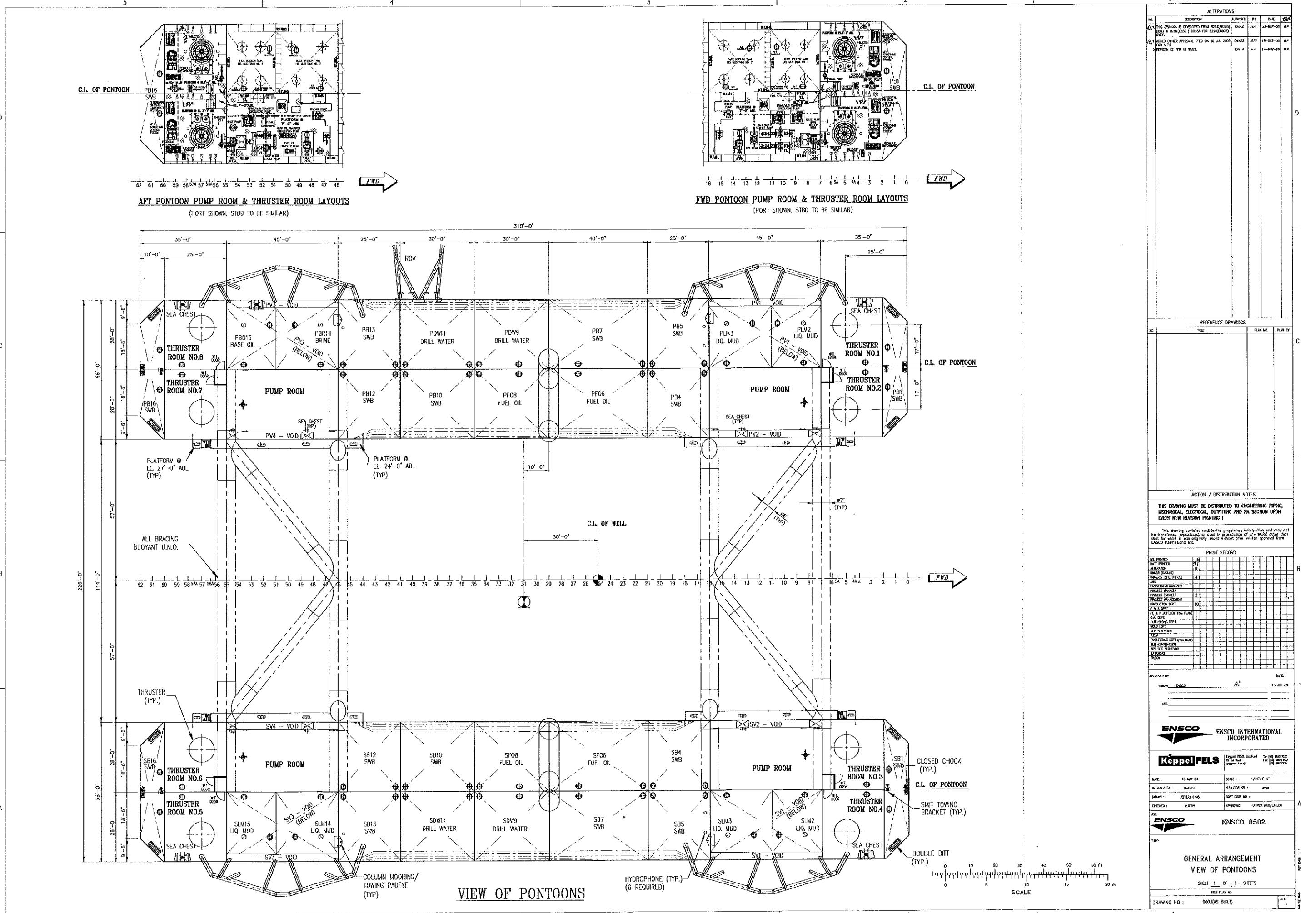
150 berths

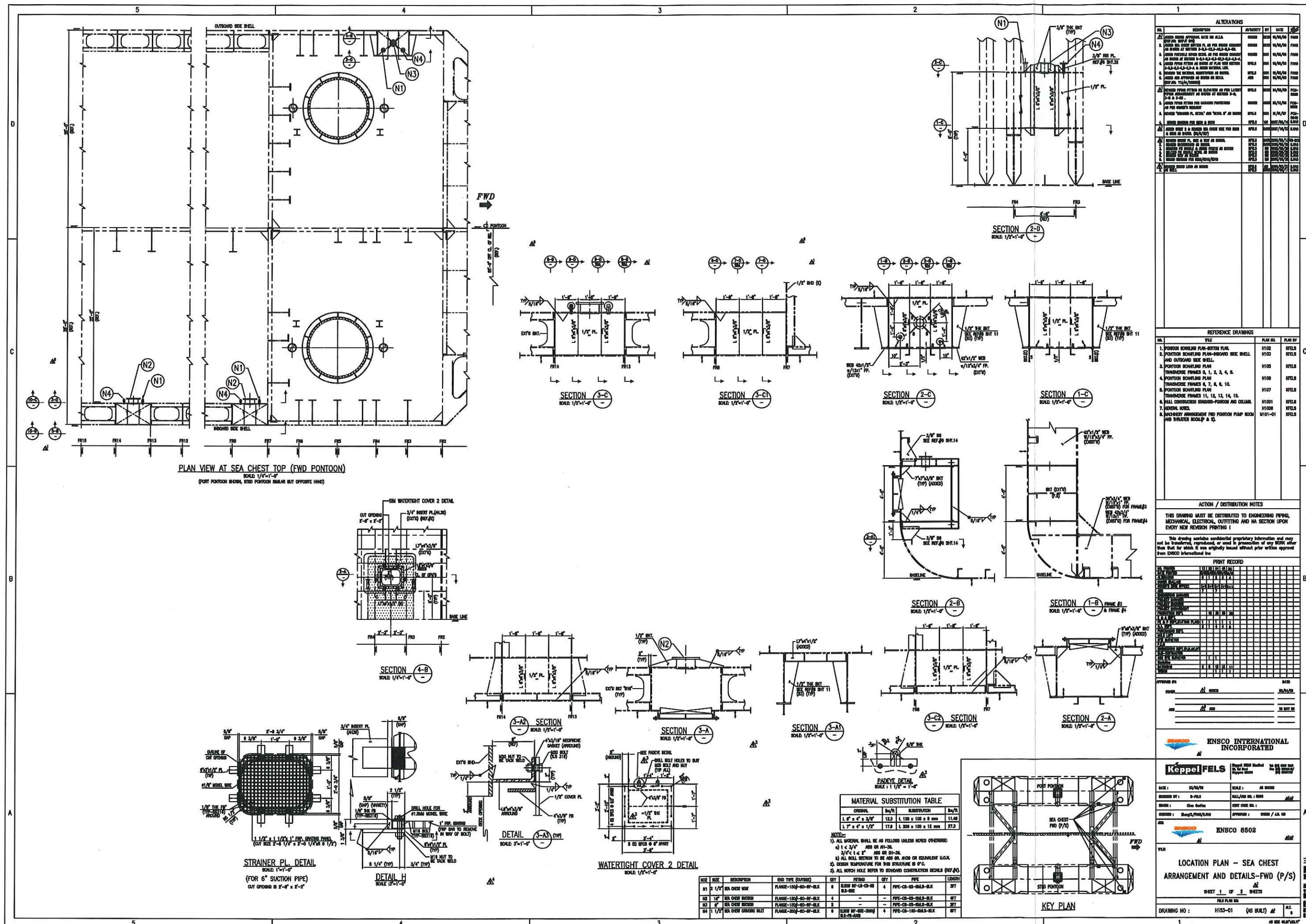
ADDITIONAL DATA

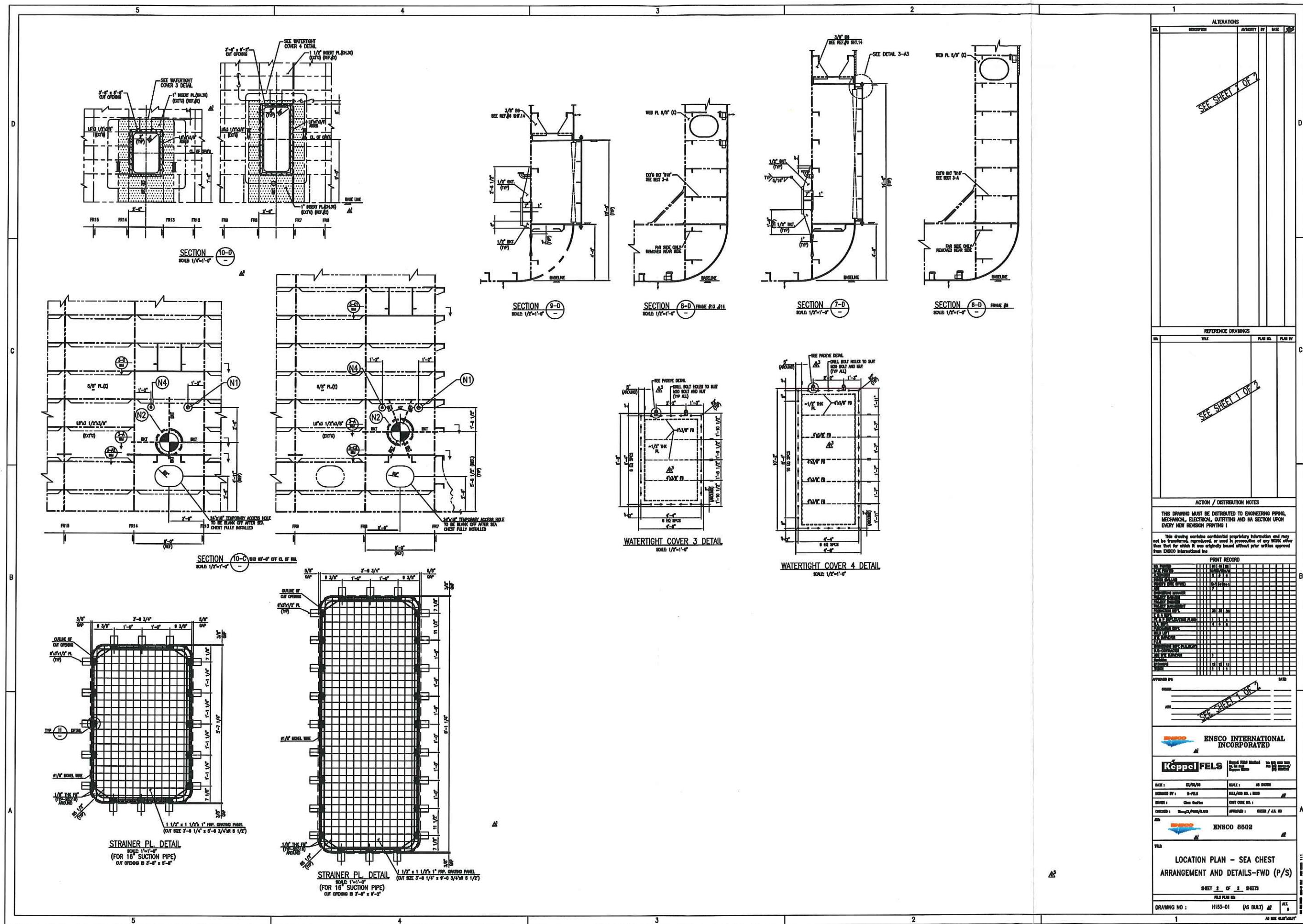
Mud cleaning facilities: (6) Derrick FLC-514; (2) Derrick Vacu-
Flo-1200 Degassers
Sewage treatment: (2) Hamworthy ST-8; single point discharge

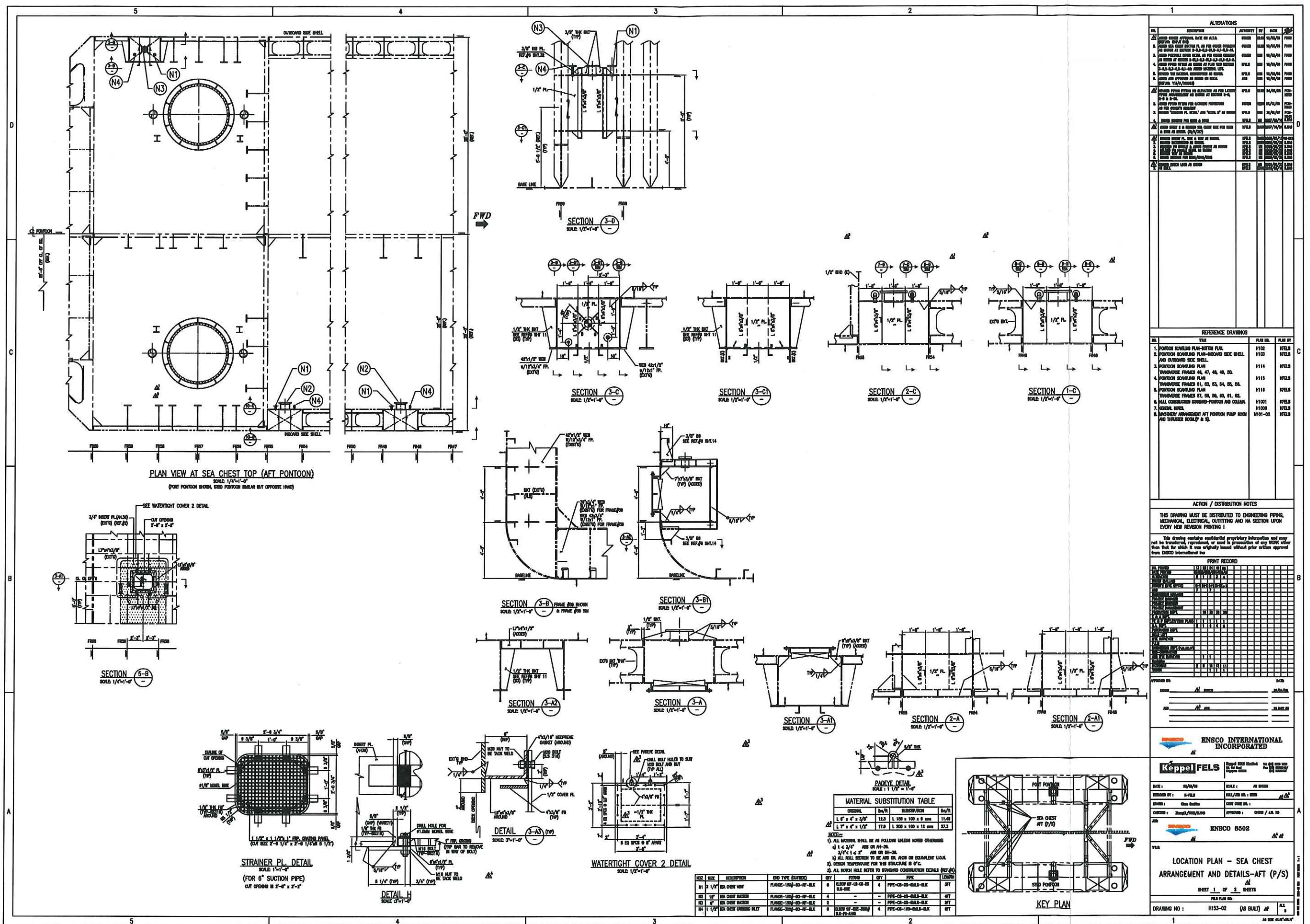


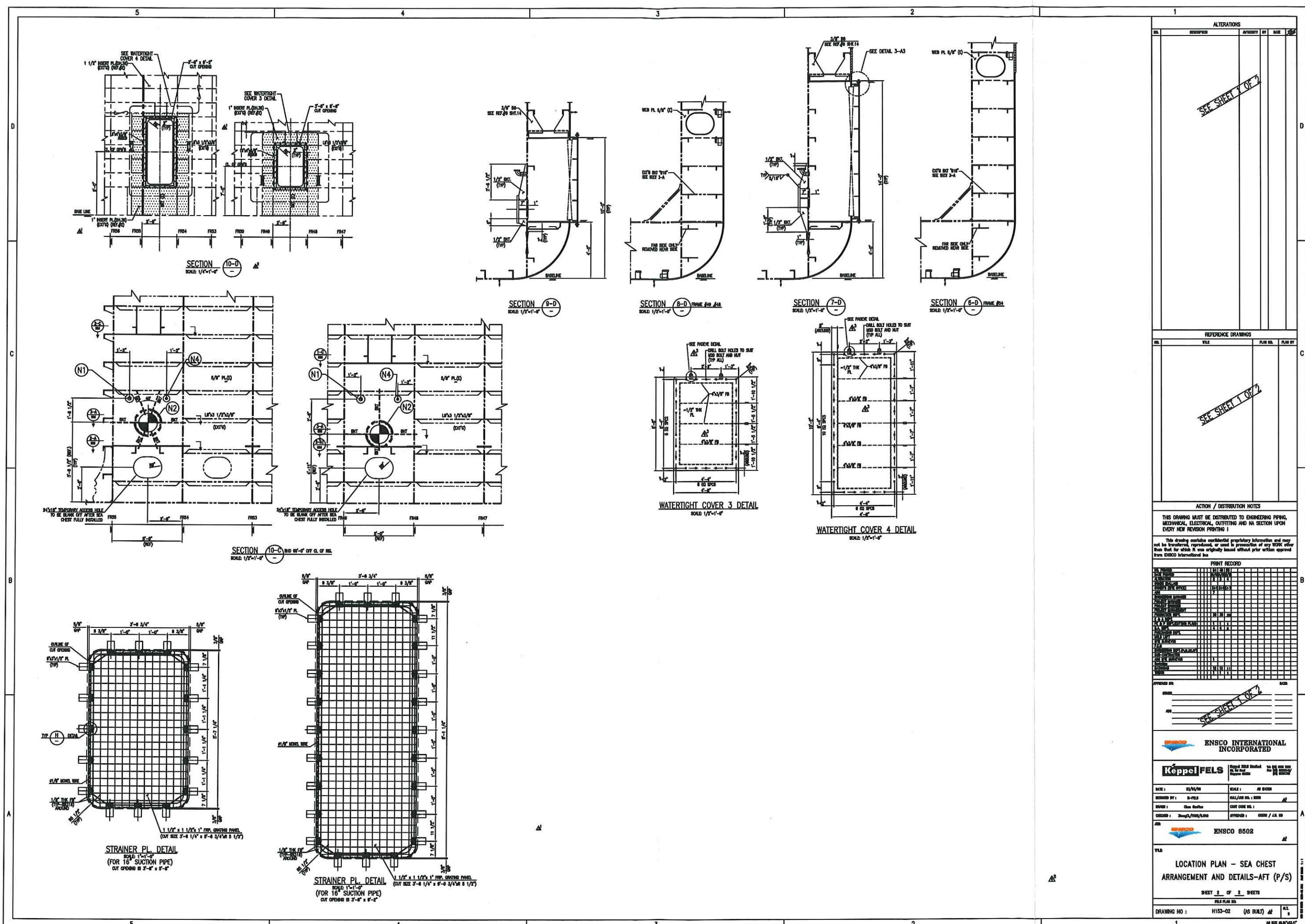


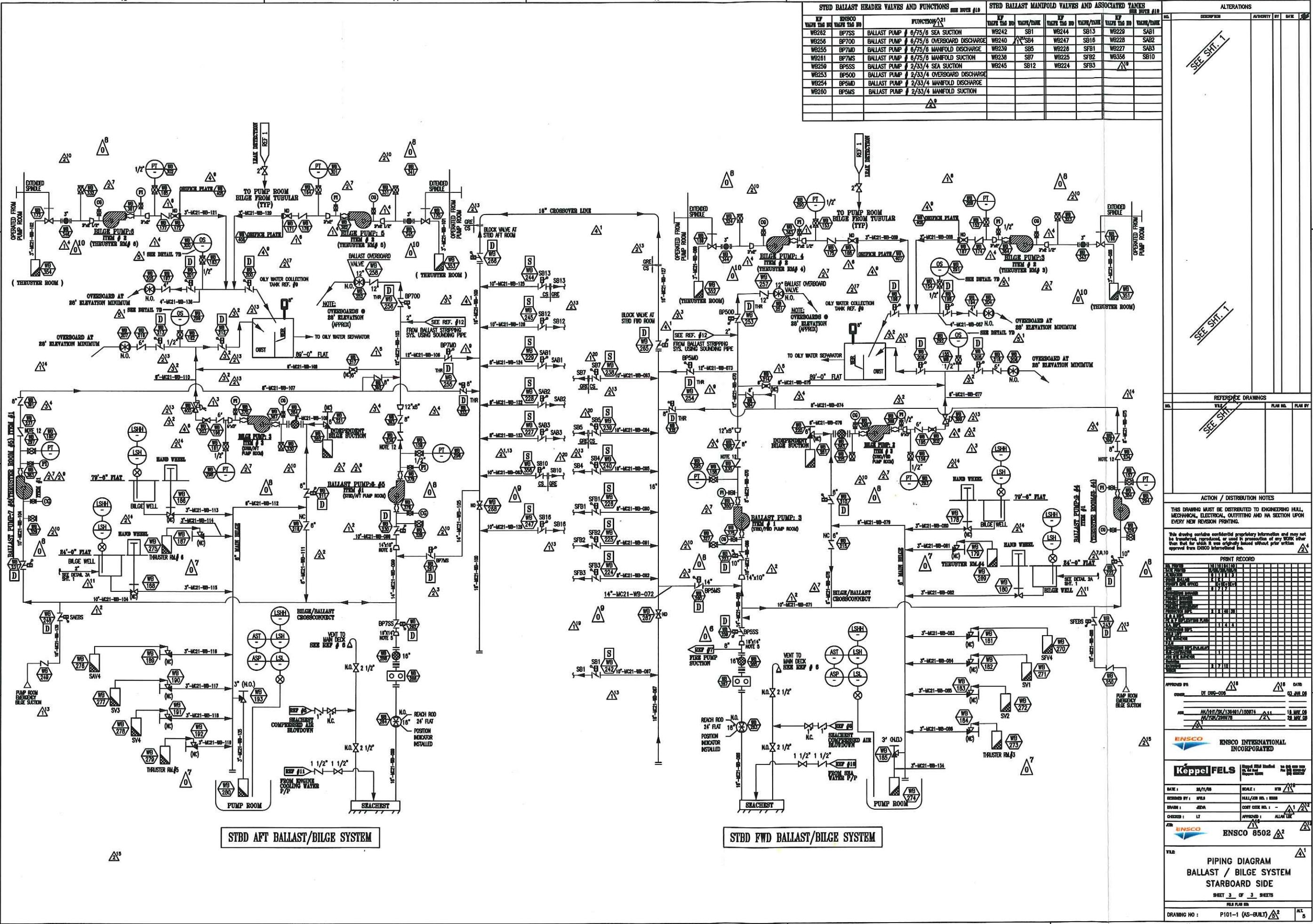






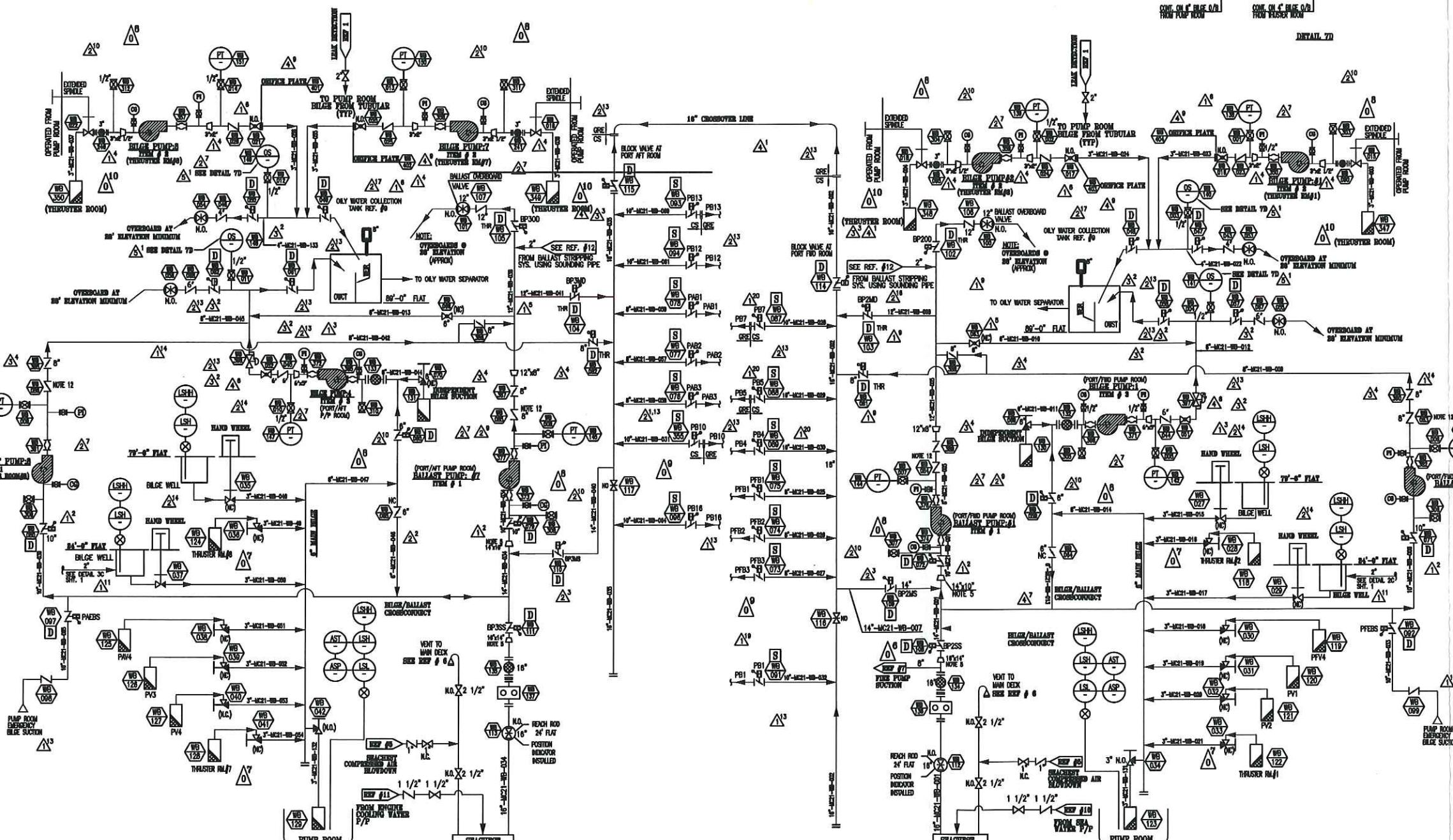




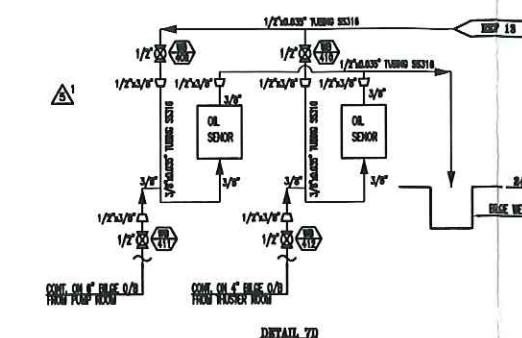


PORT BALLAST HEADER VALVES AND FUNCTIONS		PORT BALLAST MANIFOLD VALVES AND ASSOCIATED TANKS				
REF	VALVE TAG ID	FUNCTION #1	VALVE TAG ID	VALVE/DISK	VALVE TAG ID	VALVE/DISK
WB111	BP3SS	BALLAST PUMP No.57/8 SEA SUCTION	WB091	△△PB1	WB093	PB13
WB105	BP300	BALLAST PUMP No.57/8 OVERBOARD DISCHARGE	WB089	PB4	WB094	PB16
WB104	BP3MD	BALLAST PUMP No.57/8 MANIFOLD DISCHARGE	WB088	PB5	WB075	PB17
WB110	BP3MS	BALLAST PUMP No.57/8 MANIFOLD SUCTION	WB087	PB7	WB074	PB22
WB108	BP2SS	BALLAST PUMP No.1/42 SEA SUCTION	WB094	PB12	WB073	PB35
WB102	BP200	BALLAST PUMP No.1/42 OVERBOARD DISCHARGE				PB10
WB103	BP2MD	BALLAST PUMP No.1/42 MANIFOLD DISCHARGE				
WB106	BP2MS	BALLAST PUMP No.1/42 MANIFOLD SUCTION				

PORT AFT BALLAST/BILGE SYSTEM



PORT FWD BALLAST/BILGE SYSTEM



ALTERATIONS					
21	CHANGED CS TO GRC FOR 8287/8288 (0303) & ADDED ONE PIPE SPEC AS PER OWNER REQUEST	REF	KFELS	Z27/04/01/00	LT
21	ADDED ONE BILGE WELL REMOTE VALVE	REF	KFELS	Z27/04/01/00	LT
21	REMOVED MSL LOGO & ADDED CONTRACTOR DRAWING SEE REF 103	REF	KFELS	Z27/04/01/00	LT
21	ADDED BILGE STRAINER SYSTEM FOR 8287/8288/0303 AS PER OWNER REQUEST	REF	KFELS	Z27/04/01/00	LT
21	ADDED CRIST OUTLINE	REF	KFELS	Z27/04/01/00	LT
21	ADDED AND APPROVAL BASE ON REV 1 CONTRACTOR DRAWING	REF	KFELS	Z27/04/01/00	LT
21	ADDED VE IN POSITION TO MEET CLASS REQUEST	REF	KFELS	Z27/04/01/00	LT
21	ADDED LOGO & ADDED BATTERY VALVE FOR 8287/8288/0303 AS PER T0313	REF	KFELS	Z27/04/01/00	LT
21	ADDED ONE PIPE SPEC	REF	KFELS	Z27/04/01/00	LT
4	ADDED HALL NO. 8287/8288/0303 & 0304 0305/0306	REF	KFELS	Z27/04/01/00	LT
4	CHANGED DESCRIPTION	REF	KFELS	Z27/04/01/00	LT
4	CHANGED DESCRIPTION ITEM 7A & 7C TO 1/2" NPT F/F & 1/2" NPT F/F	REF	KFELS	Z27/04/01/00	LT
4	CHANGED SURFACE STRAINER MATERIAL CODE SS316L TO SS316L	REF	KFELS	Z27/04/01/00	LT
4	ADDED ONE PIPE VALVE AT 8287/8288/0303 FOR 8287/8288	REF	KFELS	Z27/04/01/00	LT
4	ADDED LINE 8"-MC21-00-078 & 8"-MC21-00-015 TO SUIT SITE CONDITION & ED 0313	REF	KFELS	Z27/04/01/00	LT
4	ADDED RECORDS FOR PRESSURE SUSTAINING VALVE & OFFICE PLATE	REF	KFELS	Z27/04/01/00	LT
4	ADDED OFFICE PLATE AT BILGE P/T BRCH IN THRUSTER ROOM FOR 8287/8288	REF	KFELS	Z27/04/01/00	LT
124	ADDED DETAIL 79	REF	KFELS	Z27/04/01/00	LT

REFERENCE DRAWINGS

FILE PLAN NO. PLAN BY



ACTION / DISTRIBUTION NOTES

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APPROVED BY	
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AM/AT/BS/254878	16 MAY 06
AM/AT/BS/254878	21 MAY 06

ENSCO INTERNATIONAL INCORPORATED

Keppel FELS

DATE : 20/1/06	SCALE : 1:100
DRAWN BY : SPBL	MAIL/CDN NO. : 0000
DESIGNED BY : JESCA	COST CODE NO. : □
CHECKED BY : LT	APPROVED : ALAN LEE

JOB ENSCO 8502 □

PIPING DIAGRAM	
REF	101010101010
BALLAST / BILGE SYSTEM	
PORT SIDE	
SECT. 2 OF 3 SHEETS	
FILE PLAN NO.	
DRAWING NO. : P101-1 (AS-BUILT)	ALL 5

